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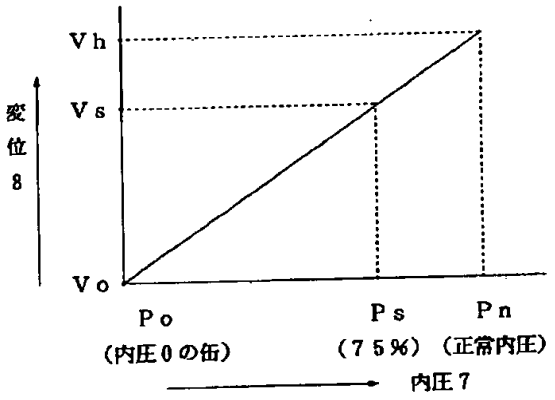
(54)【発明の名称】　缶内圧検査装置

(57)【要約】
【目的】ビール缶，ジュース缶等の封入缶の内部圧力を、缶蓋の中心点と端部との変位で、正圧缶の場合にはふくらみを、負圧缶の場合にはへこみを検出し、不良缶を排除する缶内圧検査装置であって、高速、かつ、高精度の測定が可能なため、検査要員を省人化すると同時に、品質の向上に著しい効果をあげることができる。
【構成】図５に示す如く、変位８により内圧７を検知し、変位Ｖｈ～Ｖｓの範囲内を良缶とし、設定値Ｖｓ以下を不良缶とする、缶内圧検査装置であり、変位８は缶蓋の中心点と端部の差であることを特徴とするものである。



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【特許請求の範囲】

【請求項１】　ビール缶，ジュース缶等の封入缶の内部圧力の変化を缶蓋の変位で検出し、不良缶を検出する装置において、微小検出スポットの高精度位置検出センサＰ１によって缶端部を検出すると同時に、微小検出スポットの高精度距離検出センサＤにより缶蓋端部Ｂを測距し位置検出センサＰ２が缶端部を検出すると同時に缶中心部Ａを測距し、位置，検出センサＰ３が缶端部を検出すると同時に缶蓋端部Ｃを測距して、缶蓋端部ＢまたはＣの測距値から缶中心部Ａの測距値を減じた値によって変位を検出することを特徴とする缶内圧検査装置。

【請求項２】　缶蓋端部ＢまたはＣの測距値は大きい値をとる、請求項１記載の缶内圧検査装置。

【請求項３】　位置検出センサＰ１，Ｐ２，Ｐ３，と距離検出センサＤとの検出位置関係は高精度に設定される請求項１記載の缶内圧検査装置。

【請求項４】　測距値と基準値とを比較し、基準値外の缶を不良缶として除外する請求項１記載の缶内圧検査装置。

【請求項５】　測距値と基準値とを比較し、基準値外の缶を不良缶とし、それを下限とし、良缶範囲の上限との範囲内で、任意に良缶範囲をプリセット可能とする請求項１記載の缶内圧検査装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明はビール缶，ジュース缶等に用いられる２ピース缶の缶内圧検査装置に関するものであって、従来の３ピース缶に対し、２ピース缶は缶胴が０．０８～０．０９ｍｍと薄く、そのうえ１０００缶／分という高生産であるため、成形時のスクラッチや、コーテイング時のアイホール等により、腐蝕が起って、穴があいたり、更には、缶胴と缶蓋との巻き締め部分の不具合によって、不良缶を発生せることがあった。そのため、缶内圧の変化を検出して不良缶を事前に検知することが必須要件で、出荷前に取り除かなければならなかった。

【０００２】

【従来の技術】従来から、缶内圧の変化を缶蓋の変位で検出する技術は公知であり、たとえば磁気センサ、一般な光センサ、等で検出する方法がある。しかし、これらのセンサは検出スポットが広く、その平均値が検出値となり、その上、絶対値の測定であるため被測定缶の変位や缶蓋の凹凸が測定値に影響を与え微小変位の測定は困難であった。

【０００３】他の方法としては、蓋の上面から電磁波を与え、そのときの反響周波数によって缶の良、否を判定するものもあるが、現状のように複雑な形状のタブがついていると、蓋蓋の振動が複雑となり検出は不可能であった。

【０００４】

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【発明が解決しようとする課題】従来の磁気センサ、光センサ、等による変位検出もタブが無く、かつ検出する缶の安定が保たれていれば、缶中心部の高さを検出することで装置として、利用できたが、現状のように複雑なタブ高速処理になると絶対値測定、広範囲の測定スポットでは対応でき無くなっている。

【０００５】本発明は微小な検出スポットを持つ、高精度の位置検出センサと高精度の距離ンサとの組み合わせにより、缶蓋端部の２か所と缶蓋中心部を高精度に位置決めすると同時に測距し、中心部と缶端部２か所の値の差が大きい方を検出値として、基準値と比較し、基準値外を不良缶とするものである。

【０００６】

【課題を解決するための手段および作用】缶蓋の端部を高精度に検出すると同時に缶蓋の中心部と缶蓋端部２か所を高精度に、それぞれ測距し、中心部と端部の検出値の差で正常缶と不良缶を選別するものであるから、これらのセンサはレーザ等の微小スポットで外乱につよく、かつ高速の測定機能を備えたものが用いられる。上述のように、缶蓋の変位を中心部と蓋端部の差で検出するのであるから、著しく高精度にタブ付きの缶であっても缶内圧を検出することができる。

【０００７】

【実施例】ビール缶を例に説明すると、図１はビール缶を上から見た平面図であり、最近の缶は殆どタブ４がついており、そのタブ４は缶蓋１に部材５によってかしめられている。また、缶蓋１の形状は複雑であり、タブ４で開缶し易い形状に加工されているため凹凸が多い。図２は図１のａ－ａ断面図であり、缶蓋１とタブ４の関係を示している。缶胴２は０．０８～０．０９ｍｍと薄いが、缶底部は絞られていないため、０．２５～０．３５ｍｍの板厚である。ビール缶の場合、缶胴２，缶蓋１，タブ４，かしめ材５共にアルミ材が用いらるが、缶胴２がスチール缶の場合でも、缶蓋１，タブ４，かしめ材５はアルミ材が用いられる。缶内に充填されるビールは正圧のため、もっとも内圧の影響を受ける缶蓋１が変位してふくらむことになる。

【０００８】ところが、缶胴２に微小な穴があいていたり、缶胴２と缶蓋１との巻き締め部に巻き締め不十分な箇所があると、内圧は減少し、缶蓋１は変位せずふくらまない。図５は内圧と変位の関係を示したものであり、縦軸に変位８をとり、横軸に内圧７をとると内圧が無いＰｏのとき変位も無くＶｏとなる。内圧７を上げていくと、ほぼ直線的に変位８も変化し、正常の内圧Ｐｎに達すると変位８はＶｈとなる。内圧７が零の缶の変位をテストした結果、変位のバラツキは認められなかったが、正常内圧Ｐｎの缶で変位をテストした結果、変位に僅かなバラツキが認められたものの、±５μｍ以内であり、中心部Ａのふくらみの平均値は、２０μｍであった。

【０００９】そのため、不良缶として、排除する内圧７

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は７５％のＰｓ点以下となり、対応する変位はＶｓとなる。即ち、変位Ｖｓより小さい変位の缶は不良缶となる。ここで示した値は、Ｘ社の５００ｍｌ缶のものであり、他社、或いは缶容量によって異なるので、Ｖｓの設定はその条件に応じ、テストデータをとる必要がある。図３は位置検出センサＰ１，Ｐ２，Ｐ３，と距離検出センサＤとの検出タイミングを示す模式図であり、測定対象の缶は矢印９の方向に進む、図３－Ａに示すように、微小スポットで高精度に位置を検出するセンサＰ１によって、缶の端部を検出し、検出と同時に微小スポットで高精度に距離を検出するセンサＤによって設定された缶蓋端部Ｂを測距する。

【００１０】さらに、缶が矢印９の方向に進み図３－Ｂの状態になるとセンサ２により缶の端部を検出し、検出と同時にセンサＤによって設定された缶の中心点Ａを測距する。さらに、缶が矢印９の方向に進み、図３－Ｃの状態になると、センサＰ３により、缶の端部を検出し、検出と同時にセンサＤによって設定された缶蓋部を測距する。このようにして、測距したＡ点，Ｂ点，Ｃ点，はＢ点とＣ点との大きい値からＡ点の値を減じて缶蓋の変位、即ち、ふくらみを検出する。

【００１１】図４は検出位置を設定する一例の模式図であり、位置検出センサＰ１と距離検出センサＤとの間隔はセンサＰ１が缶端部を検出する位置にあるときにセンサＤは缶蓋の端部Ｂ点にあることを示している。センサＰ２はＢ点とＡ点との間隔Ｘと等間隔のＸ１点に設置され、センサＰ３はＡ点とＣ点との間隔Ｘ４と等間隔のＸ３に設置されることを示している。

【００１２】以上の如く、本発明は缶蓋の微小変位を最

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＊もふくらみの大きい缶中心部と最も内圧の影響を受けず、ふくらみの小さい缶蓋の端部を２カ所測距することによって、Ａ点の値から、Ｂ点またはＣ点の大きい値を減ずるのであるから、缶蓋自体の変位を計測することになり、非常に高精度に缶内圧を検出することになる。

【００１３】缶蓋の端部を２か所測距するのはタブの影響を避ける為であり、正圧缶の場合には測距値の大きい値がタブの影響を受けていない。また、検出スポットは微小であることが望ましい。本実施例では、正圧缶の例を述べたが、負圧缶の場合も缶の変位が逆になるだけで全く同一の検査装置になる。

【００１４】

【発明の効果】本発明により、缶蓋にタブが付いた缶の内圧検査が可能となり、不良缶が２ＰＰＭ（２／１００万）以下といわれる業界に於いて、その期待される効果は大きい。特にタブ付き缶が採用されるようになってからは缶内圧検査装置が無いため、各ボトリングメーカー共検査のための要員が多数必要となり、そのためのコストアップは著しく、その上、信頼性に欠けるという欠点があった。

【図面の簡単な説明】

【図１】ビール缶の平面図。

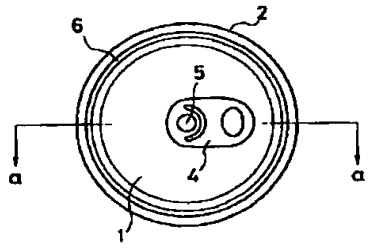
【図２】図１のａ－ａ断面図。

【図３】測定対称缶に対する、微小スポットの高精度位置検出センサと微小スポットの高精度測距センサとの測定位置関係を示す模式図。

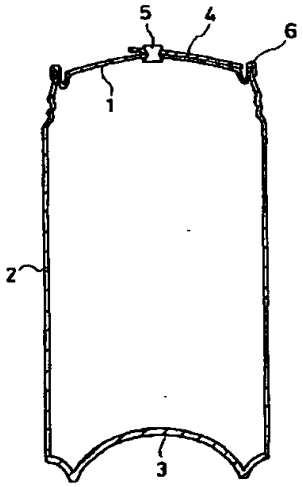
【図４】各センサの配置距離を示す模式図。

【図５】変位と内圧との関係を示す関係図。

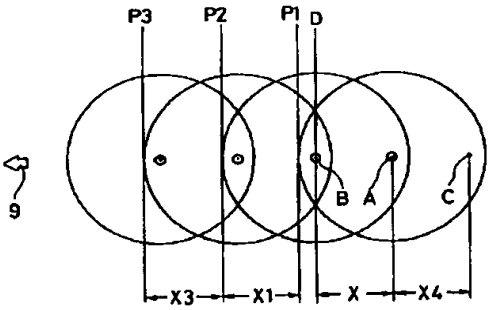
【図１】



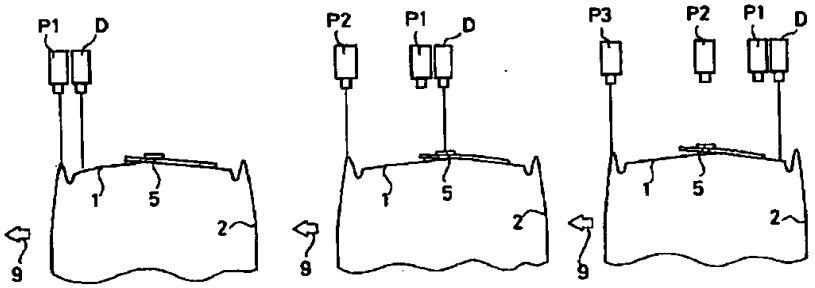
【図２】



【図４】



【図３】


P1
D
1
5
2
9
P2
P1
D
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9
P3
P2
P1
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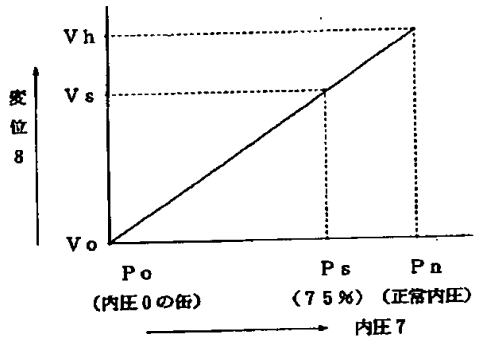
A　　B　　C

【図５】


Vh
Vs
Vo
変位δ
Po
(内圧0の缶)
Ps
(75%)
Pn
(正常内圧)
内圧P

(19) JAPANESE PATENT OFFICE

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(71) Applicant: **NIPPON SEIMITSU DENKI KK**

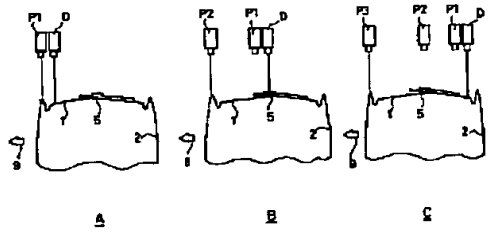
(72) Inventor: **KATABAMI HAYAO**

(54) DEVICE FOR INSPECTING INTERNAL PRESSURE OF CAN

(57) Abstract:

PURPOSE: To determine the internal pressures of cans with high accuracy even if they are tabbed by simultaneously positioning the end and center portion of each can lid and measuring the distance between the end and center portion using a position sensor and a distance sensor both of which have micro detecting spots.

CONSTITUTION: As cans for measurement advance in the direction of arrow 9, a sensor P1 that determines position with high accuracy at a micro spot detects the end of each can. At the same time, a sensor D that determines distance with high accuracy at a micro spot measures the end of each can lid. As the cans further advance, a sensor P2 detects the end of each can and at the same time the sensor D measures the distance to the center point of each can. As the cans further advance a sensor P3 detects the end of each can and at the same time the sensor D measures the distance to the end of each can lid. The value of the center point of each can lid is subtracted from the value of the measured distance to the end of each can lid to detect the displacement, that is, bulge of each can lid, thereby sorting normal cans from defective ones; that is, the measured value of the distance is compared with a reference value, and cans that do not conform to the reference value are rejected as being defective.



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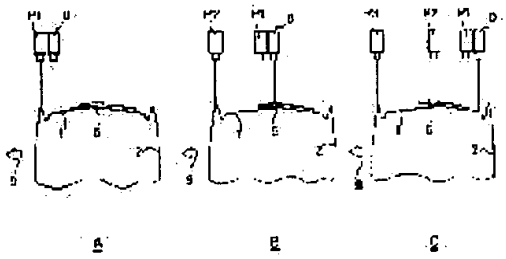

LEGAL STATUS

[Date of request for examination] 24.11.1998

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]	
[Patent number]	3140890
[Date of registration]	15.12.2000
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] this invention is a thing about the can internal pressure test stand of 2 piece can used for a beer can, a sap can, etc. Since it is moreover a high production which 2 piece can has **** as thin as 0.08-0.09mm to the conventional 3 piece can, and is called a part for 1000 tin/, the scratch at the time of molding, ******-** at the time of coating, etc. -- corrosion -- happening -- that a hole suits **** -- further -- the fault of the volume bundle fraction of **** and a can top -- a poor can -- occurrence **** -- there were things Therefore, detecting change of can internal pressure and detecting a poor can in advance had to remove before shipment on indispensable requirements.
[0002]
[Description of the Prior Art] From the former, the technique of detecting change of can internal pressure with the variation rate of a can top is well-known, for example, has the technique of detecting by the magnetic sensor, the general photosensor, etc. However, these sensors had the large detection spot, and the average turned into the detection value, moreover, since it was measurement of an absolute value, the variation rate of a measured can and the irregularity of a can top affected measured value, and measurement of minute displacement was difficult.
[0003] As other technique, although there was what gives an electromagnetic wave from the top of a lid and judges the good of a can and no with the echo frequency at that time, when the tab of a complicated configuration stuck like the present condition, vibration of **** became complicated and the detection was impossible.
[0004]
[Problem(s) to be Solved by the Invention] If the displacement detection by the conventional magnetic sensor, the photosensor, etc. does not have a tab, either, and the stability of the can to detect is maintained and it will become complicated tab high-speed processing like the present condition although it has used as equipment by detecting the height of a can core, at absolute value measurement and the wide range measurement spot, it can correspond and is lost.

[0005] With the combination of the highly precise position detection sensor with a minute detection spot, and highly precise distance ****, this invention is ranged at the same time it positions two places and can top core of a can top edge with high precision, and the difference of the value of a core and two can edges makes the larger one a detection value, and it uses the outside of a reference value as a poor can as compared with a reference value.
[0006]
[Means for Solving the Problem and its Function] Since two the cores and can top edges of a can top are ranged with high precision, respectively and a normal can and a poor can are sorted out with the difference of the detection value of a core and an edge at the same time it detects the edge of a can top with high precision, that to which these sensors equipped disturbance with the high-speed measurement function with sufficient ** at minute spots, such as laser, is used. As mentioned above, since the variation rate of a can top is detected with the difference of a core and a lid edge, even if it is a can with a tab remarkably with high precision, can internal pressure is detectable.
[0007]
[Example] If a beer can is explained to an example, drawing 1 is a plan as which the beer can was regarded from the top, the tab 4 attaches most latest cans and the tab 4 is closed to the can top 1 by the member 5. Moreover, the configuration of a can top 1 is complicated, and since it is processed into the configuration which is easy to open with a tab 4, it has much irregularity. Drawing 2 is an a-a cross section of drawing 1 , and shows the relation between a can top 1 and the tab 4. Although **** 2 is as thin as 0.08-0.09mm, since the can bottom section is not extracted, it is 0.25-0.35mm board thickness. In the case of a beer can, aluminum material uses **** 2, the can top 1, the tab 4, and the caulking material 5, and as for a can top 1, the tab 4, and the caulking material 5, aluminum material is used even when **** is [**** 2] a steel can. For positive pressure, the can top 1 most influenced of internal pressure will carry out the variation rate of the beer with which it fills up in a can, and it will swell.

[0008] However, if the minute hole has opened in **** 2, or it winds around the volume bundle section of **** 2 and the can top 1 and there is a part inadequate in a bundle, internal pressure decreases, the variation rate of the can top 1 will not be carried out, and it will not swell. When the relation between internal pressure and a variation rate is shown, a variation rate 8 is taken along an axis of ordinate, internal pressure 7 is taken along a quadrature axis and it is Po without internal pressure, drawing 5 does not have a variation rate, either and serves as Vo. If internal pressure 7 is raised, a variation rate 8 will also change almost linearly, and if the normal internal pressure Pn is reached, a variation rate 8 will serve as Vh. Although the variation in a variation rate did not accept as a result of internal pressure's 7 testing the variation rate of the can of zero and slight variation was accepted in the variation rate as a result of testing a variation rate with the can of the normal internal pressure Pn, it was less than **5 micrometers, and the average of the swelling of core A was 20 micrometers.

[0009] Therefore, the variation rate which the internal pressure 7 to eliminate becomes 75% of below Ps point, and corresponds as a poor can serves as Vs. That is, the can of a variation rate smaller than a variation rate Vs turns into a poor can. The value shown here is the thing of 500ml can of X company, and since it changes with the other company or can capacity, a setup of Vs needs to take a test data according to the condition. Drawing 3 is a ** type view showing the detection timing of the position detection sensors P1, P2, and P3 and distance detection sensor D, and the can of the measuring object ranges can top edge B set up by sensor D which detects the edge of a can and detects distance with high precision at a minute spot simultaneously with a detection by the sensor P1 which detects a position with high precision at a minute spot, as shown in drawing 3 -A which progresses in the orientation of the arrow head 9.

[0010] Furthermore, if a can advances in the orientation of the arrow head 9 and will be in the status of drawing 3 -B, a sensor 2 will detect the edge of a can, and central point A of the can set up by sensor D simultaneously with a detection is ranged. Furthermore, if a can advances in the orientation of the arrow head 9 and will be in the status of drawing 3 -C, by the sensor P3, the edge of a can will be detected and the can top section set up by sensor D simultaneously with a detection will be ranged. Thus, the value of A points is subtracted from B A points, B points, C points and **s which were ranged, and a large value C points, and the variation rate of a can top, i.e., a swelling, is detected.

[0011] Drawing 4 is a ** type view of an example which sets up a detection position, and when the spacing of the position detection sensor P1 and distance detection sensor D has a sensor P1 in the position which detects a can edge, it is shown that sensor D is in B edges of a can top. It is shown that a sensor P2 is installed in spacing X of B points and A points and x1 point at equal intervals, and a sensor P3 is installed in X3 of the spacing X4 of A points and C points and regular intervals.

[0012] Like the above, this invention is not most influenced for minute displacement of a can top of internal pressure with the can core where a swelling is the largest, but since the large value of B points or C points is reduced from the value of A points by ranging two edges of the parvus can top of a swelling, the variation rate of the can top [itself] will be measured and can internal pressure will be detected very with high precision.

[0013] Two edges of a can top are ranged for avoiding the influence of a tab, and, in the case of the positive pressure can, the value with a large ranging value is not influenced of the tab. Moreover, a detection spot has a minute desirable thing. At this example, although the example of a positive pressure can was described, also in a negative pressure can, it completely becomes the same test stand only by the variation rate of a can becoming reverse.

[0014]

[Effect of the Invention] In the industry where an internal pressure check of the can with which the tab stuck to the can top is attained, and a poor can is called below 2PPM (2/1 million) by this invention, the effect expected is large. Since especially the can with a tab comes to be adopted, in order that there might be no can internal pressure test stand, many necessary personnel for a check of each **********-car were needed, and the cost rise for it had the fault that it was remarkable and moreover a reliability was missing.

[Translation done.]